Ag line width control and improvement adhesion between the two different interface by near atmospheric pressure plasma For ink jet printing

Mu Kyeom Mun[1] and Geun Young Yeom[1,2]

[1] *department of materials science and engineering, Sungkyunkwan University, Suwon, Gyunggi-do, 440-746, South Korea*

[2] *SKKU Advanced Institute of Nanotechnology(SAINT), Sungkyunkwan University Suwon, gyunggi-do, 440-746, South Korea*

Corresponding author: gyyeom@skku.edu

Keywords: ink jet printing, Wenzel model, Near-atmospheric pressure plasma

Inkjet printing is a process to manufacture metal interconnection and metal mesh in a cheap and fast way. Inkjet printing does not require lithography and it does not give damage to substrate. Not only that, polymer substrate is also not necessary because it is low temperature process.[1] When polymer substrate is used, low material cost and flexible device are advantages.[2] However, despite these advantage, inkjet printing has a problem to fix. That problem is about control of line and enhancement of adhesion. Many different methods were applied, such as changing the temperature of the plate hydrophobic treatment,[3] and controlling the ink composition but it was still difficult to solve the problem of the line width and adhesion. In order to increase the adhesion hydrophilic surface is needed but the line width still remains as the problem. Therefore this study modified the surface using Near Atmospheric Pressure Plasma (N-APP) to solve the line width and adhesion issues. N-APP process is appropriate for surface modification of the polymer based substrate because low temperature process as in atmospheric pressure plasma (APP). Not only that, it is economically beneficial because in-line and roll to roll process is available. Adhesion and line width was controlled using N-APP process. We increases actual contact area per project area by texturing. Adhesion was increased by increasing the contact area between the two different layer. Also, to control the line width, the surface was modified hydrophobic. To find out how effective it is to inkjet printing jetting was tried. As a result, it was found that the line width decreased to 23 μm from 330 μm as it is shown in Figure. 1.

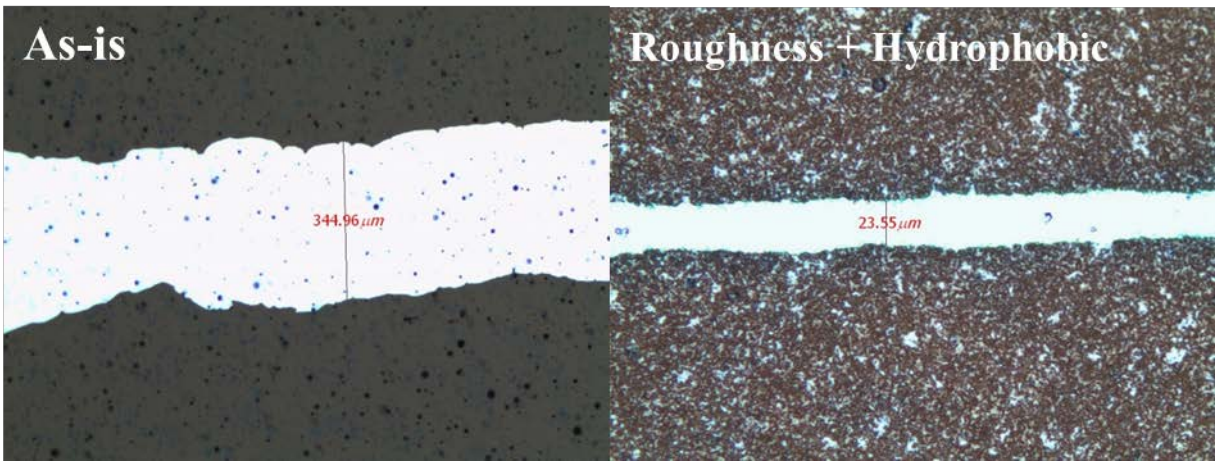

Fig. 1. Optical microscope images of the Ag lines inkjet printed on the textured polyimide surface and the flat polyimide surface

References

1. Kawase, T. Shimoda, T. Newsome, C. Sirringhaus, H and Friend. R. H, *Thin Solid Films* **438**, 279-287 (2003).
2. Ko, S. H, Pan. H, Grigoropoulos. C. P, Luscombe, C. K and Poulikakos, D. *Nanotechnology* **18**, 345202. (2007)
3. Park, J. B, Choi, J. Y, Lee, S. H, Song, Y. S and Yeom, G. Y, *Soft Matter* **8**, 5020-5026 (2012)